



HV STG4 ECAT MM Series

Type BK20 | BS20



Product description

CSM's HV STG4 BK20 and BS20 are EtherCAT®-based, robust and extremely compact measurement modules for strain gauge measurements in high-voltage environments. With four time-synchronous strain gauge inputs, they are ideally suited for distributed measurement applications under challenging conditions.

Thanks to complete galvanic isolation half and full bridges and standard strain gauge-based sensors, which are normally used in conventional low-voltage applications, can be used as well if they are combined with specific, high-voltage safe sensor cables.

The modules are especially suitable for applications in the fields of electric mobility – electric and hybrid vehicles – for stationary and mobile use.

Shipping content

- ▶ Measurement module HV STG4 BK20 | HV STG4 BS20
- ▶ Configuration software CSMconfig
- ▶ Documentation
- ▶ Device Description File (*.xml)
- ▶ Calibration certificate
- ▶ HV isolation test protocol

Key features



- ▶ **4 time-synchronous strain gauge inputs with reinforced insulation, galvanically isolated**
- ▶ **Measurement data rate up to 20 kHz per channel**
- ▶ **Supports full and half bridge strain gauges with 6- and 4-wire connection**
- ▶ **High resistance to interference due to ratiometric measuring principle and configurable software filter**



Maintenance

- ▶ HV isolation test at least every 12 months, see EN 61010 for scope of testing
- ▶ Calibration every 12 months recommended

Accessories

- ▶ See datasheet "ECAT Accessories"

Technical Data

Type designation	HV STG4 BK20	HV STG4 BS20
		
Inputs	4 time-synchronous strain gauge inputs	
Type of bridge	full and half bridges 120, 350, 700, 1,000 Ω	
Bridge connection	4- and 6-wire	
Measuring unit	mV/V, μm/m	
Input voltage range	±200 mV ¹⁾	
Internal resolution	eff. 21 bit	
Bridge balancing	via configuration software, up to 50 % of input voltage range	
Time synchronization	better than 1 μs from channel to channel	
Measurement data rate / sending rate per channel ²⁾	1, 2, 5, 10, 20, 50, 100, 200, 500 Hz and 1, 2, 5, 10, 20 kHz	
HW input filter	low-pass, 3rd order, 4 kHz at measurement data rate 1 Hz ... 10 kHz low-pass, 3rd order, 8 kHz at measurement data rate 20 kHz	
SW input filter	at measurement data rates 1 Hz ... 10 kHz: low-pass, 6th order Butterworth, 0.1 Hz to 2 kHz, switchable threshold frequency automatically adjusted to measurement data rate, alternatively adjustable per channel	
Input protection	±20 V permanent, additional ESD protection	
Measurement uncertainty		
Gain error ³⁾ at 25 °C	max. ±0.05 % of measured value	
Offset and scaling error	depending on the measurement range	
40 mV - 200 mV	max. ±0.01 %	
20 mV - 40 mV	max. ±0.02 %	
6 mV - 20 mV	max. ±0.05 %	
3 mV - 6 mV	max. ±0.1 %	
Gain drift ³⁾	±10 ppm/K	
Zero drift	0.5 μV/K	
Noise	at maximum excitation voltage (peak-to-peak)	
$f_g \leq 10$ Hz	< 1 μV/V	
10 Hz < $f_g \leq 100$ Hz	< 2 μV/V	
100 Hz < $f_g \leq 1$ kHz	< 6 μV/V	
Excitation voltage	from 1 to 5 V	from 8 to 10 V
	adjustable per channel in 0.5 V steps, optionally switchable, max. 42 mA per channel	

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Fields of application ⁴⁾	for measurements in HV environments ⁵⁾ For details see co-applicable document: "Technical Information: Fields of Application for CSM HV Measurement Modules".	
Measurement voltages (unipolar & bipolar)	200 mV peak for working voltages ⁵⁾ up to 1,000 V DC	
Routine test ⁴⁾	test voltage ⁵⁾ 3,100 V DC, isolation test is to be performed at least every 12 months	
Reinforced insulation ^{4), 5)}		
Channel / channel	1,000V RMS	
Channel / ECAT	1,000V RMS	
Channel / power supply	1,000V RMS	
Power supply / bridge excitation voltage	1,000V RMS	
EtherCAT® interface		
Configuration	Ethernet 100 Base-TX, 100 Mbit/s EtherCAT® slave controller, synchronization via Distributed Clocks or Sync Manager 3 with configuration software CSMconfig via XCP-Gateway or EtherCAT® master software via CANopen over EtherCAT® (CoE), settings and configurations stored in the device	
Power supply		
Minimum	6V DC (-10 %)	
Maximum	30V DC (+10 %)	
Power consumption	typ. 2 W	
LED indicators		
ECAT	Status / Link Activity IN / Link Activity OUT	
Measurement channels	configuration / operation	
Housing		
Protection class	IP67	
Ground connection	M6 threaded hole	
Weight	approx. 600 g	
Dimensions (B × H × T)	approx. 200 × 40 × 76 mm (Slide Case)	
Connectors		
EtherCAT® IN	LEMO 1B, 8-pole, code L	
EtherCAT® OUT	LEMO 1B, 8-pole, code A	
Signal inputs	LEMO Redel 2P, 8-pole, code E (grey/black)	

Type designation	HV STG4 BK20	HV STG4 BS20
Operating and storage conditions		
Operating temperature range	-40 °C to +125 °C	
Relative humidity	5 % to 95 % (non-condensing)	
Operating altitude	max. 5,000 m above sea level	
Pollution degree	4	
Storage temperature	-40 °C to +125 °C	
Conformity	CE (in preparation)	
Device safety	EN 61010-1:2010	
Part number	ART1301001	ART1301000

¹ Smaller ranges on request

² The following measurement data rates can be configured via XCP-Gateway: 10, 20, 50, 100, 200, 500 Hz and 1, 2, 5, 10, 20 kHz.

³ Referring to the units mV/V or µm/m measured by the module

⁴ Please also read the CSM document "Safety Instructions HV STG4 ECAT MM"!

⁵ According to EN 61010-1:2010

CSM GmbH is certified.



To product page
at www.csm.de



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